



NSW Legislative Council

Inquiry into Coal seam gas

General Purpose Standing Committee No. 5

In relation to evidence given by Doctors for the Environment Australia

17 November 2011

Supplementary Question

Can you provide evidence that extractive industries threaten Australian food production or food security?

Note : The response to this question is based on the following assumptions:

- Extractive industries are the industries engaged with the discovery or extracting of such products as stone, minerals, oil, or gas. In the context of this inquiry we assume this to be referring to the coal seam gas (CSG) industry in Australia
- By “Australian food production or food security” we assume the meaning is both food grown for domestic consumption and food grown for export.
- To wait until significant adverse impacts occur on agriculture from CSG would be irresponsible, so the potential impacts should be examined and the precautionary principle should be exercised

Sustainable food production in Australia and food security may be threatened by CSG activities in number of ways

- **loss of water which would otherwise be available to agriculture**
- **impacts on rivers, groundwater systems and aquifers, with impacts on the ecosystems that support food production**
- **reductions in water quality with increases in a range of contaminants and salinity**
- **loss of land area to CSG infrastructure and related activities such as waste disposal**
- **contamination of land and damage to soils through increasing salinity, chemical contamination, changing pH, altered soil structure**
- **potential for contamination of food products through undetected chemical traces in crop irrigation or livestock water**
- **lowered farming efficiency and even loss of farming livelihoods and quality of life in rural areas**

Background

The likelihood of a reduction in food security in Australia may appear remote given that we have enjoyed cheap, safe and high quality food for many decades. However, under projections of population growth and adverse impacts of climate change, we may be seeing years where we will import more food than we export.¹

Currently, one billion people globally suffer chronic hunger, and the United Nations estimates that food production will need to increase by about 70% from 2005–07 average levels to feed the projected world population of 9.3 billion by 2050.

The area of productive land in Australia is diminishing due to increasing urbanisation and environmental degradation, a changing climate, competition for land and water and natural disasters. The Australian government recognises there are long-term challenges to Australia's food supply and that even efficient surplus food producers like Australia suffer from droughts and other natural disasters, disease outbreaks and crop failures that can expose parts of the population to temporary food insecurity.^{1,2}

According to the Australian Government, "access to clean, safe and reliable water supplies is critical to efficient food production and processing. Agriculture uses 66 % of Australia's water, and food processing a further 1%. Long-term food security and sustainable food production requires that food production be environmentally sustainable and safe... The capacity of natural resources, including fresh water, clean air and biodiversity, to provide food and other ecosystem services will influence development of the food industry over the short and long-term."² Currently also approximately 5.7 million hectares of land are within regions at risk of or affected by dryland salinity, with this area increasing over time.¹

The CSG industry is one that extracts huge amounts of water and produces huge amounts of salt. Estimates are that there will be 40,000 coal seam gas wells in Australia, with conservatively withdrawal of 300 gigalitres of water from the ground each year. Modelling suggests the industry could produce 31 million tonnes of waste salt over the next 30 years and the industry has not yet come up with a solution of what to do with it all.³

The interim report of the recent Senate Inquiry noted "Exploration for, or production of, gas has the potential to severely disrupt virtually every aspect of agricultural production on cropping lands and, in extreme circumstances, remove the land from production."⁴

Reductions in available water quantity

The CSG industry uses enormous quantities of water. Current projections indicate the Australian CSG industry could extract in the order of 7,500 gigalitres of water from groundwater systems over the next 25 years. The National Water Commission is concerned that "CSG development represents a substantial risk to sustainable water management given the combination of material uncertainty about water impacts, the significance of potential impacts, and the long time period over which they may emerge and continue to have effect."⁵

The Senate interim report into this issue noted:

"The main cause for concern is with the potential impact of the extraction of large volumes of water on the pressure within adjacent aquifers, the stability of the intervening strata, the

levels of water and directions of flow, and the possibility of contamination of higher quality water, all of which may have a long term impact on sources of groundwater used for agriculture, rural communities and the environment.”⁴

Reductions in water quality

Contamination of water supplies is a great concern, from the chemical additives used during drilling and hydraulic fracturing, degradation products, and also the compounds that are mobilised from sediments during the mining process. These chemicals can include toxic, allergenic, mutagenic and carcinogenic substances as well as methane. Waste water coming to the surface may contain volatile organic compounds, high concentrations of ions, heavy metals and radioactive substances.

The media contains a number of other reports of contamination in wells at CSG drill sites in Australia.⁶ The interim Senate report noted “there is a risk that residues of chemicals used in fracking may contaminate groundwater and aquifers used for human or stock consumption or irrigation. There are examples where water has been contaminated. It is acknowledged that in one case in Australia, fracking resulted in damage to the Walloon Coal measures, causing leakage between that and the Springbok aquifer.”⁴

Increasingly large volumes of produced CSG water will need to be treated to remove salt and other contaminants, but removal methods are not 100% effective. For example chemicals such as benzene, and a number of chemicals used or mobilised during in fracking may be poorly removed through reverse osmosis membranes.⁷

The senate report notes “The chemical make-up of the water varies but all of it will have significant levels of dissolved salt plus a range of other chemicals – heavy metals such as arsenic, mercury and lead, naturally occurring BTEX chemicals and uranium. The water may also contain residues of chemicals used in the drilling and hydraulic fracturing processes”. Obviously many of these chemicals are potentially dangerous to human health, livestock and soils”.⁴

There are already examples of where produced CSG water has been legally discharged into waterways with contaminants of concern to the environment. Discharge of treated coal seam gas water into the Condamine River south of Chinchilla has allowed discharge of 22 chemicals in excess of ANZECC freshwater environmental guidelines, including boron, silver, chlorine, copper, cadmium cyanide and zinc, which at the limits approved are toxic to aquatic organisms.³

A farmer’s submission to the Senate Inquiry describes the problem eloquently :”It is critical that any chemicals used in drilling and CSG well stimulation activities do not migrate to the bores of groundwater users. It is critical also that natural occurring chemicals and compounds in coal seams and strata formations are not mobilised to water aquifers tapped by water bores. Many homes use bore water, the livestock we eventually eat as steak, chicken, lamb and pork from supermarkets more often than not drink it, and the plants we grow for grain and vegetables soak up bore water through their roots and foliage systems under irrigation.”⁸

Loss of agricultural land area

Considerable loss of agricultural land can occur when CSG companies move into an area. In the words of a farmer who has experienced this “CSG companies propose broad gasfield development conceptual plans for blanket areas... QGC propose placing a CSG well every 750m down to a minimum of 400m if required. Origin also propose 750m well grid spacing, Santos are a little wider with their grid spacings out to 1000m. Arrow Energy is undecided on its well spacings but suggests it too could equate to one CSG well every 750 m. Generally the well pad size is expected to be 1 hectare in size. Access tracks (roads) and gathering lines need to be constructed to each well site. The Federal Government conditioning of QGC’s and Santos’s LNP projects require roads to be 6m in width. Other infrastructure associated with gasfields includes compressor stations, ponds, screw compressors and power lines to name a few.... this is expected to directly impact on 10 000 square kilometres of Queensland’s rural and regional landscapes”.⁸

In a submission to the Senate Inquiry, “a producer of high quality wheat identified the likely impact of coal seam gas wells on his property. The gas company with a permit over this property estimated it would require only one acre in 250 for its wells. The landholder, having regard to the topography, drainage patterns, risk of erosion, plus the need for safety zones along pipelines and around wells, arrived at a figure of some 38 acres in 250.”⁴

So concerned are many rural people about this loss of land that they have developed a website where farmers can calculate their potential loss of arable land after inputting the company involved. This calculation shows that up to 8% loss of a property is possible just due to CSG wells and roads alone, not including electricity and gathering lines, pipelines, compressor stations, signage, surface venting infrastructure and holding ponds.⁹

Land degradation

Contamination of land with chemicals, increased salinity, damage to soil infrastructure, changing pH, increased compaction are all real problems. There is already evidence of land contamination from CSG activity.

The Senate committee “has seen examples of land degradation caused by seepage from extracted water storage ponds, leaking gas pipes, untreated water seeping into watercourses and erosion caused by poorly installed pipelines”.⁴

“ The stability of storage ponds is an important issue. Given the chemical make-up of the stored water, any seepage will be extremely damaging to the environment. The committee has seen, in the Pilliga area of NSW, the damage done by seepage, and in worst cases, failure of small water storages... There are also concerns about water storages being overtopped by extreme rain events or floods.”⁴

The huge problem of disposal of salt and brine has not been solved and presents risks to water and land. The Senate Inquiry estimated that the industry will be handling some 750,000 tonnes of salt per annum and noted “Storage of solid salt and brine constitutes a major potential risk to agricultural land and to waterways. The salt could be spread onto

adjacent agricultural land either by flood waters, wind or by seepage from even well-constructed storages. ... In a paper provided to the committee, it was pointed out that:

the salt will be highly alkaline made up of sodium carbonate and bicarbonate mixed with sodium chloride salt. The environmental impacts of these mixed salts are substantially more complex than that of ordinary salt.”⁴

The Queensland Department of Environment and Resource Management reports that in the first 6 months of this year there have been 45 CSG compliance related incidents, including 23 spills of CSG water during operations, 4 uncontrolled discharges of CSG water, 3 exceedance of discharge limits, 3 overflows of storage ponds, and other incidents relating to vegetation clearing and BTEX contamination.¹⁰

Lowered farm efficiency and potential loss of livelihood

CSG infrastructure involves a well every half to one kilometre and a network of roads, gas and water pipelines with their surrounding easements. This infrastructure alone breaks up productive land and makes it hard to farm. The NSW Irrigator’s council confirms that CSG infrastructure makes large scale irrigation impossible.

Reported impacts include interference with grazing: in the words of one testimony “The animals are not allowed to settle because there is a flared well every 405 metres across your land. But, all importantly, our cattle eat grass. Because of dust and disturbance to the grass the cattle cannot eat.”⁴

Also the presence of the wells requires changes to farming practices, making some machinery difficult to use and reducing efficiency.

The Senate Inquiry found that “Disruption to agricultural production can be such that the viability of a property is threatened.”⁴

Potential Contamination of food

Food that is chemically contaminated is not secure food and Australia’s reputation as a clean green food producer is very important. Only one instance of failure in water treatment which is used to produce food could be disastrous for the food production industry.

In the words of a farmer:

“Last year, Queenslanders watched as a BTEX chemical scare in groundwater from Underground Coal Gasification activities near Kingaroy forced a number of properties into quarantine. For a period of time landholders with cattle exposed to this water were unable to sell their cattle. The issue of groundwater contamination is real and not limited to UCG. The implications of activities affecting groundwater for health, the environment, food safety and domestic and international trade are also very real”.⁸

A recent example from Pennsylvania shows what can easily happen. Cattle had to be quarantined from the food chain after they had come into contact with drilling wastewater from a gas operation. The wastewater holding pond leaked contaminated water into an adjacent field where it created a pool accessible to cattle.¹¹

Let us use the example of cadmium, one of the chemicals identified as discharged in excess levels in Queensland from CSG activities.

Safemeat information notes “Cadmium can infiltrate pastures and livestock via fertilisers; soil or water, especially downstream from mining....Cadmium accumulates in soil, where it can then be transferred to plants, animals and humans.... is concentrated in the kidney and liver(and, to a much lesser extent, muscle and milk) of livestock and humans. It is important to minimise cadmium intake to protect livestock health and limit the potential for human exposure through animal products”.

Dietary intake of cadmium in Australia is low by world standards and our food exports have a ‘clean’ reputation worldwide. To maintain this advantage we need to minimise any potential cadmium accumulation in food products. Products found to contain cadmium residues that exceed the FSANZ MLs are condemned as they cannot legally be sold for human consumption.”

Also “ Higher soil chloride concentrations increase the release of cadmium from soil and uptake by plants.” (Safemeat).(Chloride levels have recently found to have been released in excess from CSG operations).¹²

Conclusion

The Senate Inquiry interim report states “The coal seam gas industry is a relatively short lived industry. It may have a life of only 25 to 30 years in most regions. However, if it is not properly regulated, that period of time is sufficient to do serious damage to agricultural productivity on some of the best farmland in Australia. Landholders are legitimately concerned about water supply, disturbance to livestock, erosion caused by access roads and pipelines, interruption to natural drainage flows, damage to soil, particularly from salt, and the spread of noxious weeds.....

In the committee's view it is both unreasonable and unwise to expose agricultural properties to the risk of long term damage, for example from loss of water, erosion or salt contamination.....In some areas intensive CSG production may be incompatible with agriculture”.⁴

There is now sufficient evidence of the threat to Australia’s agricultural food production to heed these warnings and put in place adequate safeguards.

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